



## Elderly Hip Fracture during Covid-19 Pandemic: What we are Learning

Coral Sánchez Pérez\*, Coro Solans López, Nuria Montero, Esther Carbó Laso, Fernando Vega San Vicente, Javier Vaquero Martín, Diana Crego Vita, Francisco Chana-Rodríguez

Department of Traumatology and Orthopaedic Surgery, General University Hospital Gregorio Marañón, Madrid, Spain

### ABSTRACT

**Purpose:** In December 2019 when first cases of Coronavirus 19 disease (COVID-19) appeared, we were not able to predict the spreading capacity neither infectious aggressiveness of this virus. Europe health services have been blocked to control this pandemic state. Orthopedic departments have reduced their activities just for treating the emergent and urgent pathologies such as hip fracture. The goal of this study is to describe and analyze hip fracture COVID+ patients outcomes and compare them with those observed in COVID – patients.

**Materials and Methods:** This is an observational, retrospective, descriptive study. We have registered clinical and demographical data from 43 patients that were admitted to the Emergency Department of Hospital Universitario Gregorio Marañón, with a hip fracture, from March 14th until April 22nd 2020. The minimum follow up was nineteen days.

**Results:** We registered 43 patients, 10 men and 33 women. 9 were COVID19+.7 patients died in the first month (5 of them were COVID19+) achieving a mortality rate of 62,5% in COVID19+ patients and 9% in non-infected patients. Half of COVID19+ patients showed pneumonic signs on the chest x-ray.

**Conclusion:** COVID19 is a single risk factor for death after surgery.

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## Introduction

In December 2019 when first cases of Coronavirus 19 Disease (COVID-19) appeared, we couldn't imagine the spreading capacity neither infectious aggressiveness of this virus. Europe health services have been blocked to control this pandemic state. Orthopaedic departments reduced their activities just for treating the emergent and urgent pathologies such as fractures, infections and tumors. Because of the specific biological conditions of the elderly that suffer a hip fracture, they usually present high rates of complications and mortality after surgery [1]. The objective of this review is to know the impact of this viral infection in patients with hip fracture, as COVID-19 seems to affect the global immune and inflammatory system.

## Materials and Methods

This is an observational, retrospective, descriptive

study. We have registered clinical and demographical data from 43 patients that were admitted to the Emergency Department of Hospital General Universitario Gregorio Marañón (HUGUGM), Madrid, Spain. All patients admitted with the diagnosis of hip fracture underwent laboratory test, Polymerase chain reaction (PCR) test and chest x-ray. According to the results patients were isolated as appropriate.

We consider COVID+ patients when nasal PCR was positive.

Hip fractures were classified according to AO classification. To assess patient's functional independence, we used Barthel index: 80–100 points indicate independency, 60–79 minimally dependency, 40–59 partially dependency, 20–39 severe dependency and less than 20 points indicates total dependency [2]. We also register Charlson comorbidity index [3], designed to predict 10 year survival of patients with multiple

comorbidities; the American Society of Anesthesiologists (ASA) score [4] and surgical delay (time from admission to operating room).

Data was collected from March 14th until April 22nd 2020 from patient's medical history. We used Microsoft Excel® 2014 V 14.0.0, for data register and codification. Information was transferred to the statistics program SPSS® V.21 to be analysed by our statistics service.

## Results

We registered 43 patients with hip fracture, 10 men and 33 women. Mean age was  $85,81 \pm 8,2$  years old.

Hip fracture pattern distribution was 26 intertrochanteric fractures (AO 31A), 14 subcapital fractures (AO 31B) and 3 subtrochanteric fractures (AO 32).

Barthel Index mean was 63,08 (5-100) points. Charlson comorbidity index mean was 5 (2-9) points. ASA preoperative score showed 1 patient ASA 1, 32 ASA 3, 7 ASA 4, and 1 ASA 5. There were 9 patients infected with COVID-19 (nasal COVID19 PCR+), 5 diagnosed before surgeries and 4 after surgery.

Oxygen saturation (SatO<sub>2</sub>) mean upon admission was 95,25 (87-98)%, preoperative hemoglobin (Hb) mean was 11(8-14)g/dL, preoperative leukocytes median was 10150 (4200-86000)cells/ $\mu$ l. D-Dimer was only measured in 7 patients with a median value of 12807 (191-22653) ng/ml.

They were all managed operatively with a median time from admission until surgery of 57 hours and 22 minutes. 7 patients died, 2 of them were COVID-, and they died on days 6 and 8 after surgery. The five COVID+ patients died on days 4, 11, 12, 18 and 27 after surgery.

There were more women than men infected, but in relative terms, among men 80% were COVID19- and 20% COVID19+, and among women 78,8% were COVID19- and 21,2% COVID19+, with no statistical difference.

Dyspnea was found the most frequent COVID19+ symptom. Beyond the COVID19+ patients 66,7% had dyspnea compared to the 2,9% in COVID19-, ( $p < 0,005$ ).

Pathological chest radiographs were found in 44,4% of COVID19+ and just in 3% of COVID- ( $p < 0,002$ ).

We compared the characteristics of COVID19+ and COVID19- patients. We found a COVID19+ Barthel index median of 35 (10-50) points and a COVID- Barthel index median of 70 (5-100) points, statistically significant ( $p < 0,009$ ). No statistical significance was found for time until surgery, Charlson index, ASA classification, preoperative SatO<sub>2</sub>, Hb, leukocytes or

D-Dimer variables.

Mortality rate was 62,5% in COVID19+ patients and 9,5% in COVID19- ( $p < 0,003$ ). We found that patients that died had a Barthel index median of 35 (10-50) points and those alive had a Barthel index median of 65 (5-100) points ( $p < 0,057$ ). Preoperative Hb mean in death patients was  $9,78 \pm 1,3$  g/dL and in patients that didn't die  $11,43 \pm 1,7$  g/dL ( $p < 0,024$ ). No statistical significance was found when analyzing time until surgery, sex, age, Charlson index, ASA classification, preoperative SatO<sub>2</sub>, preoperative leukocytes nor D-Dimer.

## Discussion

COVID- 19 disease is caused by SARS-CoV-2, a novel member of the Coronavirus family. These RNA viruses infect epithelial cells of the respiratory tract causing mainly mild respiratory symptoms such as the common cold. Other strains are responsible for severe pathologies such as severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS) or the ongoing COVID- 19 pandemic.

SARS- Cov-2 transmission occurs either by droplet, aerosol, contact and possibly fecal-oral route. Incubation period ranges from 1 to 14 days, being asymptomatic carriers one of the main explanations for the SARS- CoV-2 high contagiousness and rapid spread. Its symptoms range from fever, cough, myalgia to dyspnea, pneumonia and multiple organ failure.

Previous studies show that older people are especially vulnerable. Adults over 60 years [5] and more precisely those with preexisting medical conditions are more likely to have severe illness. Having more than three comorbidities has been significantly associated with increased mortality in COVID-19- positive patients [6-7].

A report by the WHO-China Joint Mission estimated that the risk of death in those without comorbidities was 1.4%; the incidence was higher in those with cardiovascular disease (13.2%), diabetes (9.2%), hypertension(8.4%), respiratory disease (8.0%), or cancer (7.6%) [8].

On the other hand, hip fracture in the elderly has a huge impact on the already compromised baseline functional status of these patients [9]. Surgical treatment is performed in most cases, unless the patient's health condition cannot tolerate the operation. In a study previously published on nonagenarians patient with hip fracture in our hospital, we found an in-hospital mortality rate of 9.6% and a 30-day mortality rate of 13.2%, being the most relevant treatable risk factor for 30 day mortality in nonagenarians the development of a respiratory infection [10].

Literature show equal numbers of cases of COVID-19 infection between men and women, but the severity and mortality seem to be higher in men. A study carried out in Wuhan on 168 patients showed a mortality rate of 12,8% in men, compared to 7,3% in women [11].

It is probably due to sex-based immunological differences and behavioral patterns. However, previous studies carried out in the elderly described similar findings to ours; no statistical differences were observed in mortality rates regarding to gender [12].

In our cohort, 20% of COVID+ patients were male and 21,2% women, no statistical differences were found regarding sex and mortality (3 women versus 1 man).

In relation to symptoms in general population, previous authors describe fever on admission in 43,8% of COVID+ patients and up to 88,7% during hospitalization, and cough in 61% of patients. In severe patients, around 14% of cases experience dyspnea, hypoxemia and acute respiratory distress syndrome [13]. When we analyze elderly patients clinical characteristics might be quite different. None of our COVID+ patients presented fever or cough on admission. However 66,7% of them experienced dyspnea throughout admission. A multicenter study carried out in Scotland also highlights the scarcity of symptoms in COVID+ elderly patients; only 7 out of 317 had suggestive symptoms on admission [14]. Arentz et al described shortness of breath as the most common symptom in 76% of 21 critically ill patients with COVID+ showed [15].

We found that 44,4% of COVID+ patients presented pneumonia on chest radiograph. Among the whole Spanish population, pneumonia prevalence is known to be 53,9%, higher than the rate found in our cohort of people over 60 years old [16].

COVID 19+ patients had a lower Barthel score (median 35, very dependent), when compared with COVID 19- patients (median 70, minimally dependent). COVID+ patients had higher mortality rates, so when comparing Barthel score and mortality we found higher mortality rate in those patients with lower Barthel scores, the difference being statistically significant. We have not carried out an stratified analysis according to Barthel score, so there might be a bias.

Although previous articles have shown ASA score as a good predictor of mortality in hip fracture patients [17], we found no statistical difference. The reason might be that in our cohort more than 70% of patients were classified as ASA 3, with a very little sample of patients classified as ASA 4 or 5.

As previous authors state, when analyzing perioperative data mortality, we found higher mortality rate be-

tween COVID+ (62,5%) and COVID- mortality (9,5%) after a minimum follow-up of 19 days. Previous meta-analysis point out coagulopathy in COVID-19 as one of the main reasons for the increase in mortality rates [18].

Muñoz vives et. al found a 30,4% mortality rate in COVID+ patients with a hip fracture at a mean follow up of 14 days [19]. The higher mortality rate observed in our cohort is probably due to a longer period of follow up, 42% of our deaths occurred on days 19, 25 and 30 postoperatively.

According to the literature performing surgery within 48 hours from hip fracture in elderly patients, has demonstrated a 20% lower mortality rate and fewer perioperative complications during first postoperative year [20]. In our cohort mean time until surgery was 57 hours. The delay was due to coagulation issues, clinical instability or unavailability of operating rooms.

Although clinical guidelines recommend performing surgery in the first 48 hours after hip fracture, and considering high mortality rates observed in COVID+ patients with hip fractures, we believe delaying surgery until clinical stability, especially in those patients with adequate pain control, might be an option [21,22].

A small sample could be considered among the limitations of this review.

Also, an important bias might be under diagnosis due to low sensitivity in PCR tests.

## Conclusion

The ongoing COVID-19 pandemic has completely changed our daily work in Orthopaedic Surgery and Traumatology Departments. It seems clear that the virus causes worse outcomes and higher mortality rates in the elderly and in patients with previous comorbidities; if we add a hip fracture, mortality rates are even worse. In this study perioperative mortality reaches 62,5% with a minimum follow-up of 19 days among COVID+ patients.

SARS-COV-2 infection preoperative screening it's mandatory to be able to predict patient's outcome.

More studies are needed to clarify death rates among the high risk COVID19+ population such as ASA 4 or ASA 5, or lower Barthel punctuation results.

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